**Experiment 5: Distance-based LED Trigger (Ultrasonic Sensor)**

cpp

CopyEdit

#define echoPin 2

#define trigPin 3

#define ledPin 13

long duration;

int distance;

void setup() {

pinMode(trigPin, OUTPUT);

pinMode(echoPin, INPUT); // FIX: echoPin must be INPUT

pinMode(ledPin, OUTPUT);

Serial.begin(9600);

Serial.println("Distance measurement using Arduino Uno:");

}

void loop() {

// Trigger the ultrasonic sensor

digitalWrite(trigPin, LOW);

delayMicroseconds(2);

digitalWrite(trigPin, HIGH); // FIX: missing trigger pulse

delayMicroseconds(10);

digitalWrite(trigPin, LOW);

// Read the echo time

duration = pulseIn(echoPin, HIGH);

// Calculate distance in cm

distance = duration \* 0.0344 / 2;

// Print distance

Serial.print("Distance: ");

Serial.print(distance);

Serial.println(" cm");

// Turn LED on if distance ≤ 100cm

if (distance <= 100) {

digitalWrite(ledPin, HIGH);

} else {

digitalWrite(ledPin, LOW);

}

delay(200); // Optional: small delay to reduce serial spam

}

**Experiment 8 (AND) Logic Gate Simulation**

cpp

CopyEdit

const int inputPin1 = 2;

const int inputPin2 = 3;

const int outputPin = 13;

void setup() {

pinMode(inputPin1, INPUT);

pinMode(inputPin2, INPUT);

pinMode(outputPin, OUTPUT);

}

void loop() {

int inputstate1 = digitalRead(inputPin1);

int inputstate2 = digitalRead(inputPin2); // FIX: Corrected typo here

if (inputstate1 == HIGH && inputstate2 == HIGH) {

digitalWrite(outputPin, HIGH);

} else {

digitalWrite(outputPin, LOW);

}

delay(100);

}

**Experiment 8 (OR) Logic Gate Simulation**

cpp

CopyEdit

const int inputPin1 = 2;

const int inputPin2 = 3;

const int outputPin = 13;

void setup() {

pinMode(inputPin1, INPUT);

pinMode(inputPin2, INPUT);

pinMode(outputPin, OUTPUT);

}

void loop() {

int inputstate1 = digitalRead(inputPin1);

int inputstate2 = digitalRead(inputPin2); // FIX: Corrected typo here

if (inputstate1 == HIGH || inputstate2 == HIGH) {

digitalWrite(outputPin, HIGH);

} else {

digitalWrite(outputPin, LOW);

}

delay(100);

}